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## CLAIM AMENDMENTS

**Please amend claims 1, 5, 10, 14, 15, 16, 17, 18, 19, 20 and cancel claims 14, 18 and enter newly submitted claims 21-23 as follows:**

1. (Previously Amended) A physical neural network based on nanotechnology ~~molecular technology~~, comprising:

a dipole-induced connection network comprising a plurality of electrically ~~molecular~~ conducting nanoconnections ~~connections~~ suspended and free to move about in a dielectric liquid solution located within a connection gap formed between at least one input electrode and at least one output electrode, wherein at least one ~~molecular~~ nanoconnection ~~connection~~ of said plurality of ~~molecular~~ conducting nanoconnections within said dielectric liquid solution ~~connections~~ can be strengthened or weakened according to an application of an electric field across said connection gap; and

a plurality of physical synapses of said physical neural network formed from said electrically ~~molecular~~ conducting ~~connections~~ nanoconnections of said connection network.

2. (Previously Amended) The physical neural network of claim 1 further comprising a gate located adjacent said connection gap, and insulated from electrical contact by an insulation layer.

3. (Original) The physical neural network of claim 2 wherein said gate is connected to logic circuitry which can activate or deactivate individual physical synapses among said plurality of physical synapses.

4. (Original) The physical neural network of claim 2 wherein said gate is connected to logic circuitry which can activate or deactivate groups of physical synapses of said plurality of physical synapses.

5. (Currently Amended) The physical neural network of claim 1 wherein said electrically ~~molecular~~ conducting nanoconnections ~~connections~~ comprise semi-conducting molecular structures.

6. (Original) The physical neural network of claim 5 wherein said semi-conducting molecular structures comprise semi-conducting nanotubes.

7. (Original) The physical neural network of claim 5 wherein said semi-conducting molecular structures comprises semi-conducting nanowires.

8. (Original) The physical neural network of claim 5 wherein said semi-conducting molecular structures comprise semi-conducting nanoparticles.

9. (Original) The physical neural network of claim 1 wherein said at least one input electrode comprises a pre-synaptic electrode and said at least one output electrode comprises a post-synaptic electrode.

10. (Currently Amended) The physical neural network of claim 9 wherein a resistance of said electrically ~~molecular~~ conducting nanoconnections ~~connections~~ bridging said at least one pre-synaptic electrode and said at least one post-synaptic electrode is a function of a prior electric field across said at least one pre-synaptic electrode and said at least post-synaptic electrode.

11. (Original) The physical neural network of claim 9 wherein at least one generated pulse from said at least one pre-synaptic electrode and at least one generated pulse from said at least one post-synaptic electrode is determinative of synaptic update values thereof.

12. (Original) The physical neural network of claim 9 wherein a shape of at least one generated pulse from said at least one pre-synaptic electrode and at least one generated pulse from said at least one post-synaptic electrode is determinative of synaptic update values thereof.

13. (Original) The physical neural network of claim 11 wherein said physical neural network comprises an adaptive neural network which is trainable based on said at least one generated pulse across said at least one pre-synaptic electrode and at least one generated pulse across said at least one post-synaptic electrode.

14. (Cancelled)

15. (Currently Amended) The physical neural network of claim 2 ~~1 wherein said molecular conducting connections comprise molecular semi-conducting structures suspended within a non-conducting solution~~ further comprising at least two electrode arrays aligned perpendicular to each other, wherein at least one of said at least two electrode arrays comprises said at least one input electrode and at least one other of said at least two electrode arrays comprises said at least one output electrode.

16. (Currently Amended) The physical neural network of claim 1 wherein a variable increase in a frequency of said electrical field across said connection gap

strengthens said nanoconnections within said dielectric liquid solution ~~molecular conducting connections thereof~~.

17. (Currently Amended) A physical neural network based on nanotechnology ~~molecular technology~~, comprising:

a dipole-induced connection network comprising a plurality of electrically ~~molecular~~ conducting nanoconnections ~~connections~~ suspended and free to move about in a dielectric liquid solution within a connection gap formed between at least one input electrode and at least one output electrode, wherein at least one nanoconnection among ~~molecular connection of~~ said plurality of electrically ~~molecular~~ conducting nanoconnections within said dielectric liquid solution ~~connections~~ can be strengthened or weakened to an application of an electric field across said connection gap;

a plurality of physical synapses of said physical neural network formed from said electrically ~~molecular~~ conducting nanoconnections ~~connections~~ of said connection network;

a gate located adjacent said connection gap and which is insulated from said connection network; and

wherein a variable increase in a frequency of said electrical field across said connection gap strengthens said electrically ~~molecular~~ conducting nanoconnections of said connection network of said physical neural network ~~connections thereof~~.

18. (Cancelled)

19. (Currently Amended) The physical neural network of claim 17 ~~wherein said molecular conducting connections comprise molecular semi-conducting structures suspended within a nonconducting solution~~ further comprising at least two electrode arrays aligned perpendicular to each other, wherein at least one of said at least two

electrode arrays comprises said at least one input electrode and at least one other of said at least two electrode arrays comprises said at least one output electrode.

20. (Currently Amended) An adaptive physical neural network based on nanotechnology ~~molecular technology~~, comprising:

a dipole-induced connection network comprising a plurality of electrically ~~molecular~~ conducting nanoconnections ~~connections~~ suspended and free to move about in a dielectric liquid solution within a connection gap formed between at least one pre-synaptic electrode and at least one post-synaptic electrode, wherein at least one molecular connection of said plurality of electrically ~~molecular~~ conducting nanoconnections with said dielectric liquid solution ~~connections~~ can be strengthened or weakened to an application of an electric field across said connection gap and said at least one pre-synaptic electrode and said at least one post-synaptic electrode;

a plurality of physical synapses of said adaptive physical neural network formed from said nanoconnections ~~molecular conducting connections~~ of said connection network;

a gate located adjacent said connection gap and which is insulated from said connection network;

wherein a variable increase in a frequency of said electrical field across said connection gap strengthens said electrically ~~molecular~~ conducting nanoconnections ~~connections thereof~~ of said adaptive physical neural network;

wherein said adaptive physical neural network ~~which~~ is trainable based on at least one generated pulse across said at least one pre-synaptic electrode and at least one pulse generated across said at least one post-synaptic electrode; and

wherein a resistance of said electrically ~~molecular~~ conducting nanoconnections ~~connections~~ bridging said at least one pre-synaptic electrode and

said at least one post-synaptic electrode is a function of a prior electric field across said at least one pre-synaptic electrode and said at least post-synaptic electrode.

21. (New) The adaptive physical neural network of claim 20 further comprising:

a gate located adjacent said connection gap, and insulated from electrical contact by an insulation layer, wherein said gate is connected to logic circuitry which can activate or deactivate individual physical synapses among said plurality of physical synapses or which can activate or deactivate groups of physical synapses of said plurality of physical synapses.

22. (New) The adaptive physical neural network of claim 20 further comprising at least two electrode arrays aligned perpendicular to each other, wherein at least one of said at least two electrode arrays comprises said at least one input electrode and at least one other of said at least two electrode arrays comprises said at least one output electrode.

23. (New) The adaptive physical neural network of claim 22 wherein said nanoconnections among said plurality of electrically conducting nanoconnections comprise a plurality of interconnected nanoparticles.